

Claims

1 A detergent free dry cleaning medium based on liquid CO₂ and including from 0.01 to 5% by weight of the cleaning medium of a cleaning additive which is at least one multi-ester having a molecular weight of not more than 750.

5 2 A dry cleaning formulation as claimed in claim 1 wherein the multi-ester includes at least one compound of the formula (I):



where

X is -C(O)O- or -OC(O)- ; such that

10 where X is -C(O)O-,

R¹ is a direct bond or the residue of a C₁ to C₁₀ hydrocarbyl group from which n hydrogen atoms have been removed; and

R² is a C₁ to C₁₀ hydrocarbyl group; and

where X is -OC(O)-,

15 R¹ is or the residue of C₂ to C₁₀ hydrocarbyl group from which n hydrogen atoms have been removed; and

R² is H or a C₁ to C₁₀ hydrocarbyl group; and

n is from 2 to 5;

the compound having a molecular weight of not more than 750.

20 3 A dry cleaning formulation as claimed in claim 2 wherein the multi-ester is of the formula (Ia):



where

X is -C(O)O-;

25 R^{1a} is a direct bond or the residue of a C₁ to C₁₀ hydrocarbyl group from which n hydrogen atoms have been removed;

R^{2a} is a C₁ to C₁₀ hydrocarbyl group; and

4 A dry cleaning formulation as claimed in claim 3 wherein the multi-ester is a dimethyl ester of adipic, glutaric or succinic acids or a mixture of such esters.

5 A dry cleaning formulation as claimed in any one of claims 1 to 4 wherein the average
30 molecular weight of the multi-ester(s) is from 150 to 300.

6 A dry cleaning formulation as claimed in any one of claims 1 to 5 wherein the average ratio of oxygen atoms to carbon atoms in the multi-ester(s) is from 1:1 to 1:5.

7 A dry cleaning formulation as claimed in claim 6 wherein the average ratio of oxygen atoms to carbon atoms in the multi-ester(s) is from 1:1 to 1:1.5.

- 8 A dry cleaning formulation as claimed in any one of claims 1 to 7 wherein the amount of cleaning additive multi-ester present in the cleaning medium is from 0.1 to 0.5% by weight of the cleaning medium.
- 9 A dry cleaning formulation as claimed in any one of claims 1 to 8 which additionally includes
5 at least one fragrance, optical brightener, fabric conditioner, enzyme and/or bleach.
- 10 A method of dry cleaning which includes contacting textile material with a detergent free dry cleaning medium based on liquid CO₂ and including from 0.01 to 5% by weight of the cleaning medium of a cleaning additive which is at least one multi-ester having a molecular weight of not more than 750.
- 10 11 A method as claimed in claim 10 wherein the multi-ester includes at least one compound of the formula (I): $R^1(XR^2)_n$ where X, R¹, R² and n are as defined in claim 2, the compound having a molecular weight of not more than 750.
- 12 A method as claimed in claim 11 wherein the multi-ester is of the formula (Ia):

$$R^{1a}(XR^{2a})_n \quad (Ia)$$

 15 where
 X is -C(O)O-;
 R^{1a} is a direct bond or a C₁ to C₁₀ hydrocarbyl group from which n hydrogen atoms have been removed;
 R^{2a} is a C₁ to C₁₀ hydrocarbyl group; and
- 20 13 A method as claimed in any claim 12 wherein the multi-ester is a dimethyl ester of adipic, glutaric or succinic acids or a mixture of such esters.
- 14 A method as claimed in any one of claims 10 to 13 wherein the average molecular weight of the multi-ester(s) is from 150 to 300.
- 15 A method as claimed in any one of claims 10 to 14 wherein the average ratio of oxygen
25 atoms to carbon atoms in the multi-ester(s) is from 1:1 to 1:1.5.
- 16 A method as claimed in any one of claims 10 to 15 wherein the amount of cleaning additive multi-ester present in the cleaning medium is from 0.1 to 0.5% by weight of the cleaning medium.
- 17 A method as claimed in any one of claims 10 to 16 which additionally includes at least one
30 fragrance, optical brightener, fabric conditioner, enzyme and/or bleach.
- 18 A method as claimed in any one of claims 10 to 17 wherein the multi-ester is pre-mixed with liquid CO₂ before contacting the textiles.
- 19 A method as claimed in any one of claims 10 to 18 wherein the cleaning process is carried out at a temperature of from -5 to 25°C.

- 20 A method as claimed in claim 19 wherein the temperature is from from 5 to 20°C.
- 21 A method as claimed in claim 20 wherein the temperature is from from 12 to 15°C.